

REMARKS

Claims 1-14 and 19-26 and 29 are pending in this application. Claims 1-9 and 20-24 are herein amended. Claims 10-19, 27 and 28 are herein cancelled. Claims 25, 26 and 29 stand withdrawn. No new matter has been added.

Support for newly amended claims 1, 8 and 9 may be found in the as-originally filed specification, for example, paragraph [0028].

Claim Objections

Claims 1 and 10 were objected to because the abbreviations “PTFE, FEP, or PFA” were found to be vague. Applicants herein amend claims 1 and 10. In light of this amendment, this objection is now rendered moot.

Claim Rejections – 35 U.S.C. §102

Claims 8 and 19-23 were rejected under 35 U.S.C. §102(b) as being anticipated by Domoto et al. (JP 09-207289, hereinafter Domoto). Applicants respectfully traverse this rejection.

A feature of claim 8 is that when said photocatalyst sheets are thermally welded to each other, and if said welded part is peeled off at the rate of 20 mm/min, then the whole of said fluorocarbon resin layer is completely peeled off from said substrate.

However, Domoto does not disclose this feature nor do any of the disclosed examples of Domoto. Domoto does not render the presently claimed invention anticipated because it does not disclose each and every feature of the presently claimed invention. Therefore, the invention

recited in claim 8 is novel over the disclosure of Domoto. Thus, the presently claimed invention recites an inventive step. Favorable reconsideration is earnestly solicited.

Claim Rejections – 35 U.S.C. §103

Claims 1-7, 9-14 and 24 were rejected under 35 U.S.C. §103(a) as being unpatentable over Domoto et al. (JP 09-207289), as applied to claim 1 above, in view of Enomoto et al. (JP 2002-096434, hereinafter Enomoto). Applicants respectfully traverse this rejection.

Claim 1 recites a photocatalyst sheet comprising a substrate made of glass fiber, a first fluorocarbon resin layer made of polytetrafluoroethylene (PTFE) coated on said substrate; a second fluorocarbon resin layer made of copolymer of tetrafluoroethylene-hexafluoropropylene (FEP) or copolymer of tetrafluoroethylene-perfluoroalkylvinylether (PFA) coated on said first fluorocarbon resin layer; and a third fluorocarbon resin layer made of copolymer of tetrafluoroethylene-hexafluoropropylene (FEP) containing photocatalysts at least of titanium oxide coated on said second fluorocarbon resin layer, of which said photocatalysts have the part exposed on said third fluorocarbon resin layer, and the ratio of said photocatalysts in said third fluorocarbon resin layer is 10 – 60 weight %, the surface of the fluorocarbon resin layer containing said photocatalysts of said photocatalyst sheet has water repellency upon ultraviolet light irradiation, and when said photocatalyst sheets are thermally welded to each other, and if said welded part is peeled off at the rate of 20 mm/min, then whole of said fluorocarbon resin layer is completely peeled off from said substrate.

The presently claimed photocatalyst sheet is considered to achieve unexpected results over the cited art. For example, in the presently claimed invention, the uppermost surface of a

substrate is coated with the third fluorocarbon resin layer made of FEP containing photocatalysts, said layer has lower melting point than the first fluorocarbon resin layer is 10-60 weight%, thereby mutual thermal welding of the third fluorocarbon resin layers or others can be easily conducted, and the strength of the thermally welded parts is not deteriorated.

Therefore, in a photocatalyst sheet of the presently claimed invention, thermal weldability is unexpectedly good between the photocatalyst sheets containing photocatalysts. Furthermore, the strength feature of the presently claimed invention is not deteriorated. See Applicants' English Translation of the PCT application, paragraph [0066] and Figs.14 to 16.

A photocatalyst of the presently claimed invention have a part exposed on the third fluorocarbon resin layer and the ratio of the photocatalyst in the fluorocarbon resin layer is 10-60 weight%, thereby the uppermost surface of the third fluorocarbon resin layer containing photocatalyst has water repellency upon ultraviolet light irradiation. A high antifouling property can also be attained by the photocatalytic action of said uppermost surface of the presently claimed invention. See Applicants' English Translation of the PCT application, paragraphs [0061] and [0062] and Figs. 15 and 16.

In the presently claimed invention, when said photocatalyst sheets are thermally welded to each other, one may see that the thermal weldability of said thermally welded parts is unexpectedly good. Moreover, a peel off test was conducted at the thermally welded part at the rate of 20 mm/min. In said peel off test, it was observed that an example was defined as good, if fluorocarbon resin layers were completely melted, and the whole fluorocarbon resin layer was

completely peeled off from glass fiber as a substrate. It was defined as no good if peeling off occurred between other fluorocarbon resin layers.

Based on the results of the peel off test, it would be obvious to a skilled artisan that the thermal weldability is good with a photocatalyst sheet in the presently claimed invention. Furthermore, the presently claimed photocatalyst sheet may be suitable for structures for outdoor use. See Applicants' English Translation of the PCT application, paragraph [0059] and Figs.15 to 16.

In claim 9, a second fluorocarbon resin is contained within the photocatalyst at least of titanium oxide (TiO_2 , TiO_3).

The presently claimed invention differs from Domoto technologically.

In Domoto, the disclosed film comprises the structure of a glass fibrous fabric 1, the two surfaces of which are provided with silicon resin layers, PTFE layers, which cover the surface of the layer 2; layers 4 containing PTFE powders and glass beads which cover layers 3; layers 5, which are fluororesin layers containing titanium oxide photocatalyst, wherein the photocatalyst particles are exposed on the surfaces; the fluororesin is selected from PTFE, FEP, PFA, PCTFE, PVDF, PETFE. See Domoto, paragraphs [0011] to [0014] and Fig. 1.

Domoto also discloses that the fluororesin layer 5 containing titanium oxide photocatalyst may be selected only from PTFE, FEP, PFA, PCTFE, PVDF and PETFE. See Domoto, paragraph [0013].

However, the combination of the layer 5 made of FEP containing titanium oxide photocatalyst and other layers 3 and 4 made of PTFE is not disclosed, taught, suggested or

provided for in Domoto. Moreover, in the disclosure and examples of Domoto, all the layers 5 are made of PTFE, which is the same material as layers 3 and 4. See Domoto, paragraph [0018] and [0020] to [0033].

In Domoto, layer 4 contains PTFE powders and glass beads. However, in the presently claimed invention, the second layer of the photocatalyst sheet does not contain PTFE powders and glass beads, nor is PTFE powder and glass beads necessary to achieve the unexpected results of the presently claimed invention.

Since the second layer of the photocatalyst sheet of the presently claimed invention is made of FEP or PFA layer, not containing glass beads, the adhesivity between the first layer and the third layer was unexpectedly improved.

Therefore, in the presently claimed invention the fluorocarbon resin layer was completely peeled off from glass fiber as a substrate in the peel-off test. The photocatalyst sheets are thermally welded together, in such a manner as for making tent storage from a film/fabric structure. The second layer of the photocatalyst sheet of the presently claimed invention achieves good thermal weldability over the cited art.

Domoto discloses a film/fabric structure material, but the welding properties of its photocatalyst sheet, as mentioned above, are not disclosed, taught, suggested or provided for. Assuming the photocatalyst sheets of Domoto are thermally welded together and the peeling test is conducted, the peel-off between the surfaces of each photocatalyst sheet or between the layers 4 containing PTFE powders and glass beads and upper most surface layer containing photocatalyst 5 may occur, to the best of Applicants' knowledge. Hence, the photocatalyst sheet

of Domoto may not be used for thermal welding; thus may not be used for making film/fabric structures.

Domoto discloses a film/fabric structure material, but does not disclose, teach, suggest or provide any reason for the water repellency being given upon ultraviolet light irradiation to FEP as the uppermost layer of a fluorocarbon resin layer containing photocatalysts, as recited in the presently claimed invention. The unexpected high antifouling property of the presently claimed invention may be due to the water repellency feature of the presently claimed invention. Thermal welding is also possible due to said FEP layer, and that the whole fluorocarbon resin layer is completely peeled off from a substrate when photocatalysts are thermally welded to each other and said welded part is peeled off at the rate of 20 mm/min.

Domoto discloses that the uppermost layer is provided with a layer containing PTFE and photocatalyst powder. However, in order for said sheet to be thermally welded, since, unlike other fluorocarbon resins, melt viscosity is quite high, and photocatalysts are contained, weld intensity for practical use could not be attained unless heated for an unrealistically long time. Here, melt viscosity of PTFE is 10^{10} - 10^{12} Pa·s, whereas that of other fluorocarbon resins it is 10^4 - 10^6 Pa·s.

That is, if photocatalyst sheets of Domoto are thermally welded to each other under the same welding condition as in the presently claimed invention for complete weldability, and the welded part is peeled off at the rate of 20 mm/min, then the whole fluorocarbon resin layer made of PTFE is not completely peeled off from a substrate, and weldability is not good. This is due to incomplete welding of the fluorocarbon resin layer made of PTFE.

Therefore, in a case where a photocatalyst sheet of Domoto is used as a film/fabric structure material, one would have a problem achieving the required intensity. Hence, a photocatalyst sheet of Domoto may not be practical to use as the film/fabric structure material.

On the other hand, photocatalyst sheets of the presently claimed invention can attain good thermal weldability when thermally welded to each other under the same welding condition and the welded part is peeled off at the rate of 20 mm/min, then the whole fluorocarbon resin layer is completely peeled off from a substrate. That is, it was recognized that fluorocarbon resin layers were completely welded, and welding intensity was good for use as a structure material, thus resulting in the presently claimed invention. This is an unobvious feature over the disclosure of Domoto.

As discussed above, Domoto does not disclose, teach, suggest or provide any reason for the features of the presently claimed invention. Furthermore, the presently claimed invention achieves unexpected results over the disclosure of Domoto. The deficiencies of Domoto are not overcome by the disclosure of Enomoto, as discussed below.

Enomoto discloses a toxic gas treatment sheet. The toxic gas treatment sheet of Enomoto comprises a first layer 5 and a second layer 6. See Enomoto, Fig. 1. Enomoto also discloses that the first layer 5 contains a PTFE 3 containing the photocatalyst particles (TiO_2) as a bonding material and the second layer 6 contains a PTFE 3 containing ceramic particles (SiC) 2 as a bonding material. Further, the second layer 6 contains an FEP 4 having a melting point lower than that of the PTFE 3. This shows that the toxic gas treatment sheet of Enomoto is a two layered structure.

There is no disclosure, teaching, suggestion, or reason provided for a FEP layer being disposed on PTFE layer. In Enomoto, FEP is only mixed with PTFE layer 6. See Enomoto, paragraphs [0026], [0027], [0030] to [0033] and Fig.1.

In Enomoto, a structure wherein FEP is mixed with PTFE layer 6 is not chemically stable. Thus, there is no reason for a skilled artisan to use such as a film/fabric structure.

Hence, the toxic gas treatment sheet of Enomoto is not used to thermally welded for making a film/fabric structure.

As discussed above, the features and unexpected results achieved in presently claimed invention are not disclosed, taught, suggested or provided for in the cited art, Domoto in view of Enomoto. Thus, the presently claimed invention is unobvious from the disclosure of Domoto and Enomoto. Favorable reconsideration is earnestly solicited.

A feature of claim 8 of the presently claimed invention is that when said photocatalyst sheets are thermally welded to each other, and if said welded part is peeled off at the rate of 20 mm/min, then the whole of said fluorocarbon resin layer is completely peeled off from said substrate. This feature is not disclosed, taught, suggested or provided for in the disclosure of Domoto in view of Enomoto.

Furthermore, claim 8 achieves unexpected results, as discussed above, over the cited art. Thus, Domoto in view of Enomoto does not render the presently claimed invention obvious. Favorable reconsideration is earnestly solicited.

For at least the foregoing reasons, the claimed invention distinguishes over the cited art and defines patentable subject matter. Favorable reconsideration is earnestly solicited.

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Amendment under 37 C.F.R. §1.111
Attorney Docket No.: 062015

Should the Examiner deem that any further action by applicants would be desirable to place the application in condition for allowance, the Examiner is encouraged to telephone applicants' undersigned attorney.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,
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